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## VALUATION OF RAILROADS IN THE STATE OF WASHINGTON

The valuation of railroads in the state of Washington was undertaken for the specific purpose of securing a basis for determining the reasonableness of railroad rates and fares on intrastate business.<sup>1</sup> The work was performed by the State Railroad Commission<sup>2</sup> during the years 1905-10. In purpose and scope the task was similar to that performed about the same time by the Railroad and Warehouse Commission of Minnesota. The methods adopted by the Washington commission, however, are in some cases unique, and the results attained are interesting.

The original commission act provided that the commission should, as early as practicable, ascertain the amount of money expended in the construction and equipment per mile of every railroad in Washington. It was soon found that a literal compliance with the terms of the act would be of little if any value to the state.<sup>3</sup> It had been clearly intimated in decisions by the Supreme Court of the United States that in ascertaining value consideration must be given not only to the original investment, but also to the cost of reproduction, to the amount and market value of the stocks and bonds, to the density of traffic and, in short, to every element that a provident investor would consider in determining the market value of property.<sup>4</sup> The commission spent much time and labor in drafting an amendment to the law, which was passed by the legislature in 1907 definitely directing the commission to ascertain every element that the courts had intimated should be considered, as well as every element that the commission after careful investigation concluded would be material as showing the true value of the property.<sup>5</sup>

The problems which confronted the commission in carrying out the duties assigned to it may be classed under three headings: (a) finding the market value of the property used by the railroads

<sup>1</sup> *Findings of Fact by Washington Railroad Commission*, p. 3.

<sup>2</sup> Recently expanded into a public service or utilities commission.

<sup>3</sup> *Findings of Fact*, p. 3.

<sup>4</sup> *Smyth v. Ames*, 169 U.S. 466.

<sup>5</sup> *Findings of Fact*, p. 4.

of the state in their capacity as common carriers; (b) dividing this value in accordance with its use for state or interstate purposes; and (c) reaching a conclusion as to the reasonableness of a schedule of rates. In the solution of these problems there were several elements of uncertainty, and the conclusions of the commission could only approximate the truth. Nevertheless, it is doubtful if the work of any other railway commission which has undertaken the task of estimating the value of railroad property has been so thorough and so closely in accord with the decisions of the federal courts as has been the work of the Washington commission.

In order to ascertain the market value of the railroad property of the state used for the public convenience, consideration was given to the original cost of construction including added improvements and betterments, to the present cost of reproducing the property new, to its depreciated value, to the density, nature, and permanence of population and traffic, to facility for doing business, and to geographical conditions. Some consideration was given to the market value of stocks and bonds; but this element, depending very largely upon the other factors named—at least in so far as these securities were not manipulated on the stock market—was not of prime importance.

In determining property values the methods adopted by the commission differed in certain respects from those adopted in other states where a similar valuation of railway property had been attempted. A greater effort was put forth to ascertain the original cost of construction. Lists were made showing all structures, their age, size, and cost, and statements were procured showing existing rails and their weight, track fastenings, ties, ballast, sidings, and the like.<sup>1</sup> As far as possible this cost of fixed equipment was ascertained from the records of the companies themselves, and where this could not be done the prevailing prices at the time of purchase were secured and added to the costs obtained from the books of the railway companies. In the same way the cost of the rolling stock was secured; but in ascertaining the cost and amount of this equipment properly chargeable, or allowable, to the state of Washington, it was necessary to procure the passenger-car, freight-car,

<sup>1</sup> *Findings of Fact*, pp. 4 and 7.

and engine mileage on the entire system of each railroad, and the same for the state, and allow to the latter the proportion which the mileage of each class of equipment in the state bore to the same class on the entire system.<sup>1</sup>

In this manner estimates were made of the original cost of the railroads of the state. In securing these estimates the roadbed, structures, and equipment of each railway were reduced to "unit quantities"; that is, "units of labor and material furnished and used" in the construction of the road.<sup>2</sup> These units taken together embraced all the elements necessary to equip the roads in their present condition. Having these unit quantities, which showed exactly what was performed, the commission was in a position to ascertain what it would cost to reproduce the property today. To the different units of construction and equipment thus found, current market prices were applied, and the cost of producing the property anew was obtained.<sup>3</sup>

In thus securing data for estimating the original cost of railway property within the state and reducing these data to unit quantities the Washington commission did a unique piece of work. Its method of arriving at the depreciation of structures and equipment was again unique. Having ascertained approximately the original cost and the cost of constructing the railway properties of the state anew, another step necessary to attainment of the market value of these properties was an adequate allowance for depreciation. It was here that the commission adopted what might be called "mortality tables of structures."<sup>4</sup> In a report to the commission it had been stated that in estimating the present or depreciated values of structures, rolling stock, and other equipment of railroads, both Michigan and Wisconsin had sent experts into the field to fix the value of each unit as a percentage of what that value would have been were the unit new. In this manner 40,000 freight cars were inspected in Michigan, and their present or depreciated value estimated.<sup>5</sup> The report suggested that greater accuracy could be attained, at less expense, by applying mortality tables. Instead

<sup>1</sup> *Findings of Fact*, p. 8.

<sup>2</sup> *Ibid.*, p. 4.

<sup>3</sup> *Ibid.*, p. 8.

<sup>4</sup> *Ibid.*, pp. 8 and 9.

<sup>5</sup> *Ibid.*, p. 8.

of appraising, for example, every locomotive or car, it would be possible to determine its age, the present value of new equipment of the same kind, and the average life of such equipment. From these data the depreciated value could be easily secured. Thus if the average car has a life of twenty-five years, it loses 4 per cent of its life every year. If its age in years is multiplied by 4 and the product is then subtracted from 100, the remainder will give its present value expressed as a percentage of its value new.<sup>1</sup>

In some instances the records of the railroads did not show the ages of particular existing structures. In such cases, however, the accounting records did show the dates when structures in general were built, or when cars were purchased. In these cases the commission endeavored to find "the average age of the money invested" in these structures or cars, and thus estimated the present or depreciated value.<sup>2</sup> Suppose, for example, there are several station buildings in existence whose ages are not known. If \$20,000 was spent for such buildings in 1898, \$40,000 in 1902, and \$10,000 in 1903, then in 1908 the average age of the money invested in these structures is found thus:

\$20,000 × 10 equals \$200,000 for one year.

\$40,000 × 6 equals \$240,000 for one year.

\$10,000 × 5 equals \$50,000 for one year.

A total of \$70,000 invested for seven years is thus secured; for \$490,000 divided by \$70,000 gives seven.

In ascertaining the market value of the railroad properties of the state, consideration had also to be given to such elements as density and permanence of traffic. The importance of this latter element was exemplified by a comparison introduced between the Tacoma Eastern Ry. and the Great Northern and Northern Pacific railways. Concerning the Great Northern and the Northern Pacific the evidence showed that their business in the state would tend to augment, since their traffic consisted largely of the products of agriculture, horticulture, and manufacture, all of which would increase as the state was settled. The testimony concerning the

<sup>1</sup> *Ibid.*, p. 9.

<sup>2</sup> *Ibid.*, p. 9.

Tacoma Eastern Railway tended to show that its business is confined largely to forest products which in the next decade would of necessity be greatly curtailed.<sup>1</sup> Considerations like these in some instances greatly affected the commission's estimates of the market value of the railroad properties of the state. In the case of the Oregon R.R. and Navigation Co. (now the Oregon-Washington R.R. and Navigation Co.) the market value was estimated at more than 20 per cent in excess of the cost of reproduction; in the case of the Northern Pacific Ry. Co., at about 1 per cent above the cost of reproduction; in the case of the Great Northern, between the cost of reproduction and the depreciated value; and in the case of the Bellingham Bay & British Columbia R.R., at less than half the cost of construction new. In the last instance the only commodities of importance produced in the region which the railroad served were forest products, one-half the life of which had already passed.<sup>2</sup>

The results of the commission's work in valuing the railway properties of the state in accordance with the methods and plans described, may be tabulated with respect to five roads as follows:<sup>3</sup>

	Total Cost of Reproduction	Original Cost	Depreciated Value	Market Value
Northern Pacific Ry. . . . .	\$109,267,909	\$ 85,301,693	\$ 98,016,645	\$110,308,450
Great Northern Ry. . . . .	61,674,557	47,029,939	56,887,079	59,577,212
Oregon R.R. and Navigation Co. . . . .	15,891,452	14,244,241	13,933,672	19,500,000
Bellingham Bay & British Columbia R.R. . . . .	2,292,841	1,739,169	2,029,148	1,100,000
Columbia & Puget Sound R.R. . . . .	4,930,481	1,696,869	.....	5,176,973

<sup>1</sup> *Findings of Fact*, p. 10.

<sup>2</sup> *Railway Age Gazette*, February 18, 1910.

<sup>3</sup> *Findings of Fact by the Railroad Commission of Washington*, and *Railway Age Gazette*, February 18, 1910. Since the work of the commission was concluded the Chicago, Milwaukee & Puget Sound and the Spokane, Portland & Seattle railways have been completed. Their valuation is not therefore included in the *Findings of Fact*, though their costs would of course be reported to the commission. As these roads have just recently been completed, original cost, cost of reproduction, and depreciated value would be practically the same.

The capitalization of each of these roads in 1910 and the market value of their properties within the state of Washington, as ascertained by the commission, may be indicated as follows:<sup>1</sup>

	Capital Stock Outstanding	Bonded Indebtedness	Total Stocks and Bonds	Market Value of Property within the State
Northern Pacific Ry. . . . .	\$248,000,000	\$ 299,051,000	\$547,051,000	\$110,308,450
Great Northern Ry. . . . .	209,970,250	100,018,939	309,989,189	59,577,212
Oregon R.R. and Navigation Co. . . . .	35,000,000	23,380,000	58,380,000	19,500,000
Bellingham Bay & British Columbia R.R. . . . .	1,000,000	659,000	1,659,000	1,100,000
Columbia & Puget Sound R.R. . . . .	1,000,000	.....	1,000,000	5,176,973

It will be observed that the commission's estimate of the market value of the Columbia & Puget Sound R.R. is several times the par value of its outstanding securities, and somewhat in excess of its cost of construction new. For reasons already given the market value of the Bellingham Bay & British Columbia R.R. is appraised at less than one-half of its cost of construction new and at less than its outstanding issues of stock and bonds. The Northern Pacific and Great Northern railways and the Oregon R.R. and Navigation Co. are great interstate roads, and any comparison between their outstanding securities and the market value of their properties within the state of Washington could not of course be made. Even a comparison between the capitalization per mile and the average market value per mile within the state would be misleading, as the physical conditions of Washington differ very widely from those obtaining in the parts of other states served by these roads. It may be said, however, that the commission estimated the market value per mile of the Northern Pacific Ry. at \$67,800; of the Great Northern Ry. at \$77,200; and of the Oregon R.R. and Navigation Co. at \$39,000.<sup>2</sup>

<sup>1</sup> Figures for the capitalization of these roads are taken from Moody, *Manual of Railroads and Corporate Securities*, 1910. The year 1910 is selected, as the commission's work in valuing the properties of these roads was completed then.

<sup>2</sup> *Findings of Fact*, and *Railway Age Gazette*, February 18, 1910. The mileage of the roads within the state is as follows: Northern Pacific Ry., 1,629; Great Northern Ry., 770; and Oregon R.R. and Navigation Co., 501.

Some of the railroads of Washington own considerable property which is not used for operating purposes. Some of this property is located in the larger cities of the state, and the railroad companies alleged that it was held for future operating purposes. In co-operation with county assessors the commission had the value of all property not used by the railroads as common carriers, nor likely to be so used in the near future, deducted from their original tentative findings. The Northern Pacific Ry. Co., for example, owned commercial property in Tacoma aggregating in value \$5,000,000; in Seattle, aggregating in value \$9,250,000; and in Spokane, amounting approximately to \$1,194,155. The Great Northern Ry. owned similar property in Seattle exceeding in value \$9,000,000. Evidence showed that all this property was not used by these roads for operating purposes, nor likely to be in the near future, as alleged by the roads in question. Hence these properties were not included in the final report of the commission.<sup>1</sup>

Having arrived at estimates of the physical and market value of railroad property within the state, the commission was confronted with another intricate task—that of differentiating the values of properties used in the conduct of state and interstate business respectively. This division had never before been adequately made by any other railroad commission. From the standpoint of state authority a railroad crossing state boundaries is devoted to two uses, state and interstate. Traffic moving entirely within the state is state business and within the jurisdiction of the state; all other traffic is interstate business and outside of such jurisdiction.

In making this differentiation the commission endeavored to ascertain the value of the use of that part of each interstate road doing state business. By expert accountants the movement of traffic and cars over the division of each road within and without the state was determined from the records of the railroad companies themselves for the years 1906, 1907, and 1908.<sup>2</sup> In this movement the unit of measurement in the case of freight was the ton-mile; and in the case of passenger traffic, the passenger-mile. The number of ton-miles of each commodity and each class of freight

<sup>1</sup> *Findings of Fact*, p. 11.

<sup>2</sup> *Ibid.*, pp. 13, 97, and 230.



with the average distance hauled was ascertained. Similar figures were secured with regard to passenger traffic. A fair division was thus made from these data between state and interstate traffic.<sup>1</sup>

In separating the value of this traffic and assigning to the state its proper share, it was necessary to consider not only the volume but also the character of the freight hauled. If all freight were of the same classification, and were moved at the same cost, the division of value would be determined by the volume of the movement. This, however, is not the case. State traffic of low class, such as logs, may have little or no interstate movement, while high-class interstate traffic, such as silks, may have little or no state movement. Having secured the volume of movement of the different classes and commodities in ton-miles, it was necessary in order to meet this difficulty to put all commodities on an equality as to classification, as classification largely determined the rate charged by the railroads, or the value of the movement. By multiplying the volume of each class and commodity, state and interstate, expressed in ton-miles, by the ratio of the rate charged to the first-class rate, a result is secured which states the amount of the movement in units equivalent to ton-miles of the first class.<sup>2</sup>

A further step, however, is necessary before that part of the market value of interstate roads devoted to state uses can be properly segregated. The cost of moving a ton one mile on a short state haul is not the same as the cost of moving the same ton a longer distance across several state boundaries. Hence the value of a ton-mile must be further equalized by allowance for the relative cost of haul. The cost of haul is obtained by multiplying the ton-mile product obtained above by a factor which expresses the cost of the state haul relatively to the cost of the interstate haul in the different classes and commodities. This gives the ton-miles equalized as to both classification and cost of haul, and the result represents the quota of value assignable to state traffic.

The process may be illustrated by selecting two of the most important commodities carried by the railroads of the state,

<sup>1</sup> *Ibid.*

<sup>2</sup> This process was explained to the writer by Mr. John C. Lawrence, one of the members of the commission.

grain and lumber. The figures are those of the Great Northern Ry. Co.<sup>1</sup>

	GRAIN		LUMBER	
	State	Interstate	State	Interstate
I. Ton-miles handled.....	12,711,744	1,664,937	2,123,708	34,851,693
II. Ratio of rate to first-class rate.....	0.147	0.117	0.121	0.109
III. Equivalent ton-miles corrected by ratio of rates (I×II) .....	1,868,626	194,798	256,969	3,798,835
IV. Relative cost of ton-mile haul.....	0.8820	1.00	1.4499	1.00
V. Equivalent ton-miles corrected by ratios of cost and rates (III×IV).....	1,648,128	194,798	372,579	3,798,835

Applying the process to all classes of freight on the Great Northern Ry., the totals and percentages were as follows:

	PRODUCT OF TON-MILES AS EQUALIZED BY RELATIVE COST	
	State	Interstate
Totals.....	4,715,317	7,983,993
Percentage.....	37.13	62.87

Passenger traffic was treated in like manner and the result on the same road may be similarly expressed:

	PRODUCT OF PASSENGER-MILES AS EQUALIZED BY RELATIVE COST	
	State	Interstate
Totals.....	1,057,729	594,336
Percentage.....	64.02	35.98

From the percentages obtained, freight and passenger, there remained the final step of securing the proportions to be assigned to state and interstate trade on the whole traffic. On the Great Northern the freight earnings were 70.83 per cent and the passenger

<sup>1</sup> See *Findings of Fact*, p. 229.

earnings 29.17 per cent of the total for the period considered, 1906, 1907, 1908. Hence:

State freight . . . . .	$0.3713 \times 0.7083 = 0.2630$	} 44.97 per cent
State passenger traffic . . . . .	$0.6402 \times 0.2917 = 0.1867$	
Interstate freight . . . . .	$0.6287 \times 0.7083 = 0.4453$	} 55.03 per cent
Interstate passenger traffic . . . . .	$0.3598 \times 0.2917 = 0.1050$	

It will thus be seen that the value of the property of the Great Northern Ry. Co. in the state of Washington used by it for the accommodation of state business was estimated by the commission at approximately 45 per cent of the total market value as already given, the remaining 55 per cent being used in interstate business. As the market value of the operating properties of the Great Northern Ry. within the state, or properly assignable to the state, was appraised at \$59,577,212, the part of this value assignable to state traffic, and on which the road was entitled to earn a reasonable return from such traffic, was \$26,809,745.40.<sup>1</sup>

In the case of the Northern Pacific Ry. similar percentages were secured. The market value of the operating properties of this road, within or assignable to Washington, was estimated at \$110,308,450, of which 41 per cent, or \$45,226,464.50 was allotted to state business.<sup>2</sup> The commission had some difficulty in the case of the Oregon R.R. and Navigation Co. in apportioning the estimated market value between state and interstate use, because that company failed, or refused, to furnish information concerning its operating divisions according to state lines.<sup>3</sup>

In reaching a conclusion as to the division of the value of railway property in accordance with the value of its use for state and interstate purposes, the commission had no precedent to guide it. It was the desire of the commission to establish a basis which could not be attacked in the courts for determining the reasonableness of rates and fares on state traffic. The question, however, had never been fully presented to the courts, and where it had been partially considered much was left undecided. It was clear,

<sup>1</sup> *Findings of Fact*, p. 230.

<sup>2</sup> *Ibid.*, p. 97.

<sup>3</sup> *Ibid.*, p. 310. Figures are not given in the *Findings* concerning the segregation of values into state and interstate uses on this road. The writer has been unable to secure any figures concerning the valuation of this road later than the *Findings*.

however, that in order to ascertain the part of the value of each interstate road properly allotted to state traffic, consideration must be given to the rates charged. Otherwise a comparison could not be made between a state haul of a ton of logs and an interstate haul of a ton of silk. Furthermore, the division between state and interstate values would be but slightly affected by any ordinary changes in rates.<sup>1</sup>

Having arrived at the market value of property within, or assignable to, the state, and the part of that value properly apportioned to state traffic, the commission approached the problem of determining the reasonableness of rates in the light of the facts found and enumerated. That portion of the value of railway property found to be devoted to state use became the capitalization on which a company was entitled to earn a reasonable return. The amount of this return was not definitely fixed but assumed at seven per cent.<sup>2</sup>

When it came to the question of determining particular rates, two of the three commissioners adopted the principle of cost of service. "It is true that in making of particular rates many matters besides the cost of service must be considered. But a division of value is based, not on a particular rate, but on an entire schedule of rates. The reasonableness of returns on such schedule must be based on the cost of service as a prime factor in such determination. This view is sustained by eminent authorities and appeals to common-sense and fairness."<sup>3</sup> The chairman of the commission, while admitting that cost of service is an important element and should be considered, held that there is no fixed relation between the cost of service and a reasonable and proper rate, and denied the assumption that each ton-mile of the same or a similar commodity should return a profit based upon the relative cost of service in handling the ton-mile.<sup>4</sup>

In accordance with the views of the majority of the commission, figures were secured from the railway companies concerning their

<sup>1</sup> See *Findings of Fact*, No. 93.

<sup>2</sup> J. C. Lawrence, *Reasonable Railway Rates and How They are Determined*, p. 12.

<sup>3</sup> *Findings of Fact*, pp. 231 and 232.

<sup>4</sup> *Ibid.*, pp. 236 and 237. Statement of H. A. Fairchild.

operating expenses and their earnings on state traffic. Little difficulty was experienced in getting the gross earnings on the different commodities and classes of freight, but the problem of dividing operating expenses among the various classes and commodities and separating the expenses incurred for state and interstate traffic was exceedingly involved. The problem, however, was solved in a way satisfactory to the commission and to the public, and some substantial reductions in rates were secured.<sup>1</sup>

As a result of the findings of the commission grain rates on state shipments were reduced by an amount approximating \$750,000 per annum.<sup>2</sup> Consequent reduction in adjoining states, owing to the interrelation of rates, increased the amount to about \$1,250,000 per annum. No appeal was taken by any of the railroads affected, and the decision of the commission under the laws of the state of Washington became final.<sup>3</sup>

The attempt on the part of the majority of the commission to reduce railway rates to a cost-of-service basis indicates an attitude wholly at variance with the views of railway economists generally. It is doubtful, however, if the cost theory will be seriously applied on any extensive scale to particular rates.

Another feature of the commission's work is open to criticism. The market value of the railway property of the state was determined in part by the probable increase or decrease of its traffic in the future. Thus, as already indicated, the properties of the Oregon R.R. and Navigation Co. within the state were appraised at over 20 per cent more than their cost of construction new, and those of the Bellingham Bay & British Columbia R.R. more than 50 per cent below cost of reproduction. Here we have, to some extent at least, a capitalization of probable future earnings. In one case the railroad is allowed a return on values based on traffic which does not exist today but in all probability will exist at some time in the future; while in the other the valuation or capitalization upon which the road is allowed a reasonable return is reduced

<sup>1</sup> It is not the purpose of the writer to discuss this phase of the subject except in its relation to the valuation of railway property.

<sup>2</sup> J. C. Lawrence, *Reasonable Railway Rates*, etc., p. 15.

<sup>3</sup> *Ibid.*

because its traffic will be curtailed in the future. Such a valuation or capitalization is admissible from the standpoint of the investor, but hardly from the standpoint of the shipper in the one case or of the railroad in the other, if this valuation represents the amount upon which a uniform return is allowed by the state. The commission, it is true, is not bound to set as a limit any definite and uniform percentage of profit. However, the commission's valuation of a road is supposed to be the capitalization upon which it is entitled to a fair return. If one road is allowed a high rate of profit on its valuation because its traffic is apparently temporary in nature, and another only a low rate because its traffic is relatively permanent or increasing, much adverse comment is likely to be excited, even when these differences between the roads are appreciated.

It is also to be observed that state regulation of rates is not without its effect on the charges imposed on interstate traffic. As already indicated, the lowering of grain rates within the state of Washington was immediately followed by a similar reduction on shipments from the adjoining states. Whether or not state regulation will be allowed in the future to operate in such a way as to force railroads to change their rates on commodities crossing state boundaries is one of the issues involved in the rate cases now pending before the Supreme Court of the United States. If the state is allowed free scope in the matter of intrastate rates the future activities of the commission (now a public service commission) in its relation to railroads will be of considerable public interest. Whatever criticisms may be made of the commission's theories of rate-making, its work in valuing railway property and its differentiating the parts assignable to state uses from the parts in interstate use, must be regarded as one of the most thorough ever attempted.

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